CLAIMS

What is claimed is:

1. A multi-domain vertical alignment display, comprising:

a liquid crystal display device having a fringe field associated with each pixel of the device, the fringe field in each pixel being substantially used to control the liquid crystal tilt direction to create the multi-domain vertical alignment display.

2. The multi-domain vertical alignment display of Claim 1, wherein the liquid crystal tilt direction is controlled by a driving scheme to create a multi-domain vertical alignment domain profile.

3. The multi-domain vertical alignment display of Claim 2, wherein the driving scheme is a column inversion driving scheme, a row inversion driving scheme, or a pixel inversion driving scheme.

4. The multi-domain vertical alignment display of Claim 3, wherein the pixel inversion driving scheme creates a four-domain vertical alignment display.

5. The multi-domain vertical alignment display of Claim 3, wherein the column inversion and the row inversion driving schemes create a two-domain vertical alignment display.

6. The multi-domain vertical alignment display of Claim 3, further comprising boundary lines to reduce or eliminate the fringe field from extending into neighboring pixels.

7. The multi-domain vertical alignment display of Claim 6, wherein the boundary lines are maintained at a reference voltage.

8. The multi-domain vertical alignment display of Claim 7, wherein the reference voltage is ground potential.

9. The multi-domain vertical alignment display of Claim 1, further comprising an optical compensation film to improve the viewing angle of the display.

10. The multi-domain vertical alignment display of Claim 9, wherein the optical compensation film is a negative birefringence anisotropic optical film.

11. The multi-domain vertical alignment display of Claim 9, wherein the optical film is a uniaxial film or a biaxial film.

12. The multi-domain vertical alignment display of Claim 1, wherein the multi-domain vertical alignment display is a monochromatic liquid crystal display, a color display, a multi-domain homogeneous (parallel) liquid crystal display, a multi-domain twisted nematic liquid crystal display, a transmissive-type liquid crystal display, a reflective-type liquid crystal display, a transflective-type liquid crystal display, or a hybrid-oriented nematic liquid crystal display.

13. A method of creating a multi-domain vertical alignment display, comprising:

in a liquid crystal display device having a fringe field associated with each pixel of the device, substantially controlling the liquid crystal

tilt direction in each pixel using the fringe field to create the multi-domain vertical alignment display.

14. The method of Claim 13, wherein controlling includes a driving scheme to create a multi-domain vertical alignment domain profile.

15. The method of Claim 14, wherein the driving scheme is a column inversion driving scheme, a row inversion driving scheme, or a pixel inversion driving scheme.

16. The method of Claim 15, wherein the pixel inversion driving scheme creates a four-domain vertical alignment display.

17. The method of Claim 15, wherein the column inversion driving scheme or the row inversion driving scheme creates a two-domain vertical alignment display.

18 The method of Claim 15, further comprising reducing or eliminating the fringe field from extending into neighboring pixels.

19. The method of Claim 18, wherein reducing or eliminating the fringe field includes installing boundary lines between the neighboring pixels.

20. The method of Claim 19, wherein the boundary lines are maintained at a reference voltage.

21. The method of Claim 20, wherein the reference voltage is ground potential.

22. The method of Claim 13, further comprising adding an optical compensation film to the display to improve the viewing angle of the display.

23. The method of Claim 22, wherein the optical compensation film is a negative birefringence anisotropic optical film.

24. The method of Claim 22, wherein the optical film is a uniaxial film or a biaxial film.

25. The method of Claim 13, wherein the multi-domain vertical alignment display is a monochromatic liquid crystal display, a color display, a multi-domain homogeneous (parallel) liquid crystal display, a multi-domain twisted nematic liquid crystal display, a transmissive-type liquid crystal display, a reflective-type liquid crystal display, a transflective-type liquid crystal display, or a hybrid-oriented nematic liquid crystal display.

26. A multi-domain vertical alignment display, comprising:

a first substrate and a second substrate;

a plurality of rows and a plurality of columns formed on the second substrate, the intersection of which forming a plurality of pixels;

liquid crystal material disposed between the first and second substrates, liquid crystal molecules having a vertical orientation and each pixel having an associated fringe field when an electric field is applied between the first substrate and the second substrate; and

a controller for substantially providing a tilted orientation of the liquid crystal molecules only the fringe field associated with each pixel.

27. The multi-domain vertical alignment display of Claim 26, wherein the controller utilizes a driving scheme to create a multi-domain vertical alignment domain profile.

28. The multi-domain vertical alignment display of Claim 27, wherein the driving scheme is a column inversion driving scheme, a row inversion driving scheme, or a pixel inversion driving scheme.

29. The multi-domain vertical alignment display of Claim 28, wherein the pixel inversion driving scheme creates a four-domain vertical alignment display.

30. The multi-domain vertical alignment display of Claim 28, wherein the column inversion and the row inversion driving schemes create a two-domain vertical alignment display.

31. The multi-domain vertical alignment display of Claim 28, further comprising boundary lines to reduce or eliminate the fringe field from extending into neighboring pixels.

32. The multi-domain vertical alignment display of Claim 31, wherein the boundary lines are maintained at a reference voltage.

33. The multi-domain vertical alignment display of Claim 32, wherein the reference voltage is ground potential.

34. The multi-domain vertical alignment display of Claim 26, further comprising an optical compensation film to improve the viewing angle of the display.

35. The multi-domain vertical alignment display of Claim 34, wherein the optical compensation film is a negative birefringence anisotropic optical film.

36. The multi-domain vertical alignment display of Claim 34, wherein the optical film is a uniaxial film or a biaxial film.

37. The multi-domain vertical alignment display of Claim 26, wherein the multi-domain vertical alignment display is a monochromatic liquid crystal display, a color display, a multi-domain homogeneous liquid crystal display, a multi-domain twisted nematic liquid crystal display, a multi-domain parallel liquid crystal display, a transmissive-type liquid crystal display, a reflective-type liquid crystal display, a transflective-type liquid crystal display, or a hybrid-oriented nematic liquid crystal display.

38. A method of creating a multi-domain vertical alignment display, comprising:

providing a first substrate and a second substrate;

forming a plurality of pixels on the second substrate;

disposing liquid crystal material between the first and second substrates, liquid crystal molecules having a vertical orientation and each pixel having an associated fringe field when an electric field is applied between the first substrate and the second substrate; and

substantially controlling a tilted orientation of the liquid crystal molecules using the fringe field associated with each pixel.

39. The method of Claim 38, wherein controlling includes a driving scheme to create a multi-domain vertical alignment domain profile.

40. The method of Claim 39, wherein the driving scheme is a column inversion driving scheme, a row inversion driving scheme, or a pixel inversion driving scheme.

41. The method Claim 40, wherein the pixel inversion driving scheme creates a four-domain vertical alignment display.

42. The method of Claim 40, wherein the column inversion and the row inversion driving schemes create a two-domain multi-domain vertical alignment display.

43. The method of Claim 40, further comprising reducing or eliminating the fringe field from extending into neighboring pixels.

44. The method of Claim 43, wherein reducing or eliminating the fringe field includes installing boundary lines between the neighboring pixels.

45. The method of Claim 44, wherein the boundary lines are maintained at a reference voltage.

46. The method of Claim 45, wherein the reference voltage is ground potential.

47. The method of Claim 38, further comprising adding an optical compensation film to improve the viewing angle of the display.

48. The method of Claim 47, wherein the optical compensation film is a negative birefringence anisotropic optical film.

49. The method of Claim 47, wherein the optical film is a uniaxial film or a biaxial film.

50. The method of Claim 38, wherein the multi-domain vertical alignment display is a monochromatic liquid crystal display, a color display, a multi-domain homogeneous (parallel) liquid crystal display, a multi-domain twisted nematic liquid crystal display, a transmissive-type liquid crystal display, a reflective-type liquid crystal display, a transflective-type liquid crystal display, or a hybrid-oriented nematic liquid crystal display.

51. A multi-domain vertical alignment display, comprising:

means for substantially controlling the LC tilt direction in each pixel of the display using a fringe field associated with each pixel.